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STILLWATER, OKLAHOMA

The Oklahoma Farmstead

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(Courtesy of Agricultural Engineering)

Many Oklahoma farms possess buildings which, while structurally sound, are inadequate to present needs, therefore remodeling seems the best solution of the problem. This photograph illustrates what artistic and adequate results can be obtained where good taste and skill are applied to the job.

"It takes a heap o' livin'
To make a house a home."

Circular No. 74. October, 1928.

THE OKLAHOMA FARMSTEAD

Oklahoma is leaving the pioneer stage and entering a period of rural development which ought to afford our farm population all the conveniences and comforts compatable with the accepted American standards of living. Farming is a family enterprise, and for this reason the term "home" applied to the farm includes not merely a residence, but an entire group of buildings with the accompanying yards, roads, and lawn. It is with the buildings and grounds as a group that this bulletin deals.

Each building in the group, and the group in its general arrangement, should provide for convenience, sanitation, privacy, and safety; and in addition to these the item of attractiveness should always be kept in mind. These are essentials which mark the great difference between a real modern farm home and merely a place to stay; they are attributes common to great and small, and no design is desirable which omits one of them.

Convenience implies such grouping of units and utilization of space as will reduce to a minimum the time and energy necessary to accomplish the daily routine. It further implies the availability of heat, light, water, and mechanical power.

Sanitation commences with the water supply and ends with disposal of sewage; it includes the provisions for warmth, ventilation, exclusion of vermin, storage of foods, cleanliness, and sterilization. It might be noted that the mortality is considerably higher in rural than in urban communities; a somber commentary on our farm sanitation as a whole.

Privacy demands separate quarters for various individuals in herd and family. It is poor design if shoats must be confined adjacent to a farrowing pen, or the kitchen serve as a thoroughfare to other portions of the house. It is a violation of the laws of privacy if the cows must be driven through the hog yard in order to reach the stable, or a guest pass through the host's bedroom to take a bath even though such an arrangement might be otherwise economical and convenient.

Any rural structure should offer reasonable safety against the hazards of wind and fire. Poor construction, inadequate bracing, faulty wiring, and makeshift chimneys, along with a disregard to the proximity of hazards outside such as hay storage, oil tanks, and weed patches is costing our farm people a heavy toll in loss which it would be much more economical to prevent.

THE BUILDING PROGRAM

While satisfactory results are sometimes a matter of chance, they usually come as a result of forethought and painstaking effort.* Persons having the ability to map out a program of building in their minds without recourse to paper and pencil are rare. In the majority of cases we should draft a map and attack the problem in a systematic way.

*In a count of one hundred farmstead groups taken along a certain highway only three rate as well laid out; the remaining ninety-seven are mute testimonials to haphazard planning of the group as a whole. In this count there are five well designed barns, and two houses; one properly developed water supply, and six adequately drained stockyards. Yet there has been enough money expended on thirty out of the hundred to give them first rating.

An excellent contour map may be drafted by laying off a base line as indicated in Fig. 1, and running a series of profiles from points along this base at right angles to it with the farm level. The contour lines are drawn in freehand connecting the points of equal elevation; the distances are measured by careful pacing, and the rodman ought to know the length of his pace by checking the count in a measured one hundred feet, but more accurate

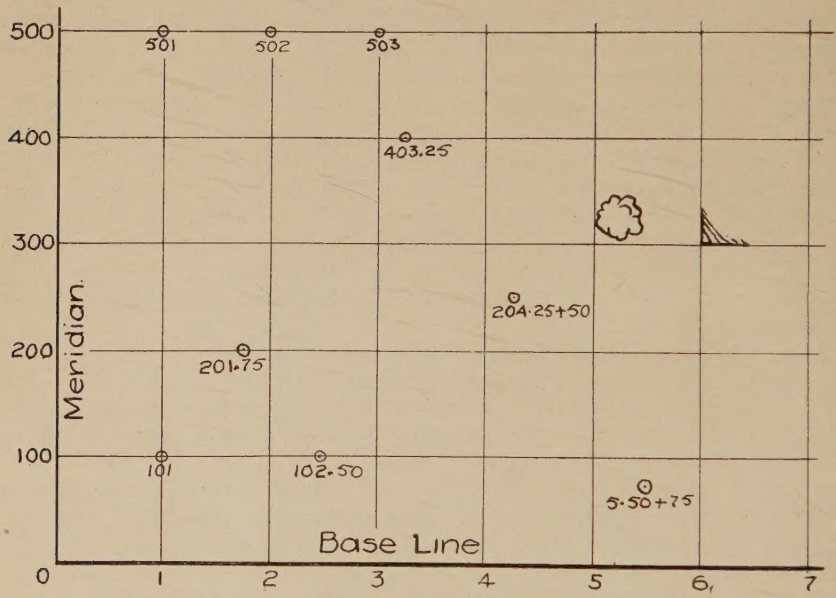


Fig. 1. Method of Laying Out a Farmsted for Mapping.

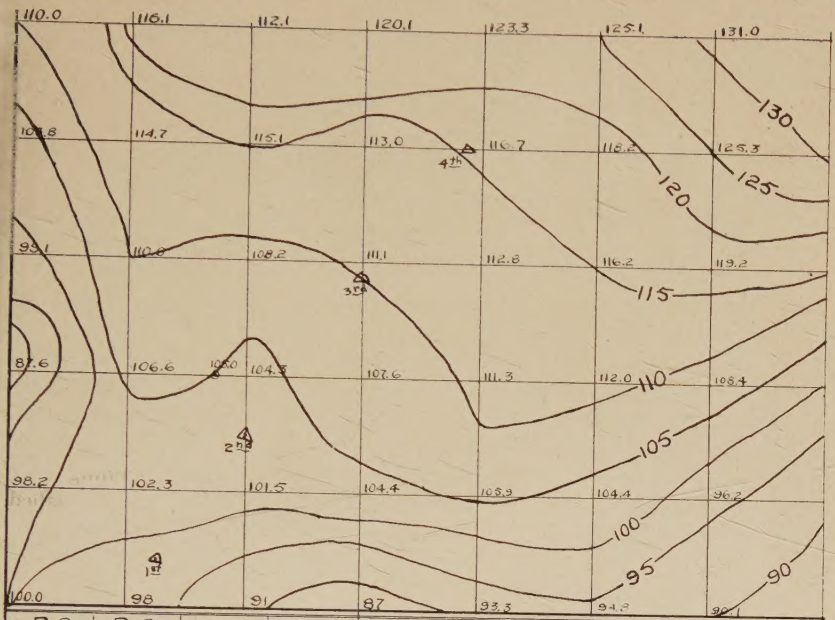
Stakes are set out a hundred feet apart each way by measuring off the base and meridian rows with a tape and sighting in the others as in planting orchard trees. With the farm level and rod the relative elevations are determined and recorded in the notebook.

Features of the ground such as ditches, rock ledges, and trees are located by measuring along parallels and meridians. In the diagram above rod station No. 102.50 is located on parallel No. 100 and fifty feet beyond meridian No. 2. The plus sign is used to indicate the distance beyond a meridian line along a parallel.

results can be obtained with a tape, rope or wire. Learn to step accurately just thirty inches, the three foot pace usually attempted its too tiresome and cannot be maintained up slopes and through tall grass.

In Fig. 2, is a copy of the field notes from which the map illustrated is drafted; in those cases where the mastery of technique pertaining to the farm level seems impracticable expert assistance ought to be employed.

Next in order is the Building Program Scrapbook in which maps, field notes, newspaper clippings, price quotations and memoranda regarding dimensions and arrangements are filed. Building is more or less a matter of precedent, and the majority of builders dread innovation or unusual methods when attempting anything so costly and permanent, and for this reason our progress in building design is slow. The information gathered from this



R.S.	B.S.	H.I.	F.S.	Elev.	Memo.
0	4.6	104.6	—	100.0	Δ 1.30 +40 B.M. sandstone boulder
1			6.6	98.0	Elev. = H.I. − F.S. 104.6 − 6.6 = 98.0 ; 104.6 − 2.3 = 102.3
101			2.3	102.3	
102	5.2	106.7	3.1	101.5	Δ 102+50 H.I. = Elev + B.S. 101.5 + 5.2 = 106.7
201.75			1.7	105.0	Oak tree
202			2.4	104.3	
103			2.3	104.4	
104	9.3	115.2	0.8	105.9	Δ 203+80
301			5.2	110.0	H.I. = 105.9 + 9.3 = 115.2 ; 115.2 − 5.2 = 110.0 ; 115.2 − 7.0 = 108.2
302			7.0	108.2	
303			4.1	111.1	
203			7.6	107.6	
204			3.9	111.3	
304			2.4	112.8	
403			2.2	113.0	
401	4.6	119.3	0.5	114.7	Δ 303.90 H.I. = 114.7 + 4.6 = 119.3
502			7.2	112.1	119.3 − 7.2 = 112.1
660					

Fig. 2. Field Notes and Topographic Map.

The triangles marked 1st, 2nd, 3rd, and 4th are positions where the farm level was set up to take observations on the stakes set as illustrated in Fig. 1. The elevation of each stake is recorded on the chart and lines representing vertical intervals five feet apart sketched in. Contour points on parallels and meridians are chosen proportional distances to the vertical intervals; for instance, a 95 contour would pass midway between points marked 93 and 97, and one sixth the distance from 96 to 90.

scrap book will be of great comfort and assistance when the final plan is attempted.

THE CHOICE OF BUILDING SITE

In selecting a building site we ought to reserve for agriculture the more level, richer soils and place the farmstead on the rough, poor land. There are four important reasons for making this choice.*

1. Rough land furnishes easily drained sites for yards and buildings.
2. The value of the land is not sufficient to cause stinting of areas set to trees and grass.
3. The presence of native rock, timber, and prairie grass makes for better immediate development of the group.
4. The artistic possibilities for landscape work are greatly enhanced. No piece of ground is so difficult to beautify as a flat, fertile field, because we must look at the site practically edgewise. The majority of prospective builders are incredulous and nonplussed when a really desirable farmstead site is pointed out to them. They have difficulty disassociating building value from tillable value, and can hardly realize that in some respects a washed, rough, rocky, basin-shaped waste may be an asset instead of a liablity. They have not yet learned to appreciate the engineering possibilities; and consider the farmstead as an engineering project.

LOCATION OF BUILDINGS

We have an unfortunate heritage in three ideas circumscribing the methods of locating farm buildings, and until we can shake ourselves loose from them we will never make the most of our opportunities and utilize to the utmost our natural advantages. There is no reason why

(1) The residence must be closer to the highway than the other buildings.

(2) buildings and yards must parallel the points of the compass.

(3) we must build close to well.

The first idea is borrowed from the village practice of setting the residence close to the street and approaching it directly from the front; a thing we should assiduously avoid in farmstead planning. The second arises from our section line location of roads and fences; our highway authorities realize that this is an engineering mistake and to correct it they are now buying right-of-ways and relocating for paved roads. The third arises from the fact that our pioneers did not have water pipes, nor understand the danger from drinking water contaminated by surface drainage.

The residence ought to stand at a greater elevation than the other buildings, and be readily approached by a drive. The other buildings should range along this drive in an easterly or westerly direction, the location of the granary and machine shed to the north or south in permissable because

*In our count sixty-nine per cent placed their buildings on land well suited to crop production and disregarded the unproductive areas available; in other words, they reduced their income by the misuse of tillable land.

their contents are not likely to give off obnoxious odors to be carried to the dwelling by the prevailing winds which in this state are more or less northerly and southerly in direction. Swarms of flies at the residence are more prevalent when the location is to the weather or lee of a stockyard.

If the residence basement can be excavated in rock, all the better. The same is true of the cow stable. The three graces of a good basement are height, light and drainage; and with these essentials a basement cow stable in which we may install sanitary water service without fear of freezing is a highly desirable, yet very frequently overlooked, possibility. For economy in time and effort the dairy stable, horse stable, poultry house, and piggery should range approximately as named in distance from the house, with the hay barn set away from the other buildings to reduce the fire hazard. In these days of trolleys, trundle truck, and hay balers there is no saving in time, effort or building cost by putting hay in the mow over livestock, and if the hay barn is set somewhat higher than the stables and feeding yards, enormous loads are readily conveyed by the devices indicated above, and the fire danger to stables and livestock becomes negligible, thus giving a peace of mind well worth considering, and a type of insurance free from annual premiums.

As a general rule the lighting through vertical windows is most effective if the building stands with its long axis north and south; the east and west sunlight of morning and evening is eagerly sought during the winter by young stock and poultry, while the midday intensity may be avoided. Furthermore, midday sunshine usually entices most domestic animals outside if there is protection from wind. Owing to the fact that the ultra-violet ray does not penetrate ordinary glass, there is little benefit from direct sunlight through glazed windows, and so far as sanitation is concerned the value of window light is negligible, yet sunshine through glass is a source of comfort in winter and makes the interior of the building more attractive. It should be borne in mind that doors and windows play small part in the solution of modern stable lighting and ventilating problems, and that a room can be very adequately lighted, heated, and ventilated without a window in it, and more sanitary than the usual run of buildings depending on the stoves and windows of days gone by. This does not imply that windows should be dispensed with, but that artificial lighting and ventilation are integral with modern design and twenty-four hour availability for use is readily provided.

In most cases the position of the building ought to be determined by the driveway and contour of the ground; so its points of unloading are adjacent to the road, and its long axis parallel with the ridge it occupies. This greatly improves the perspective of the group and if thought is given to appearances we can often place tall structures such as elevators, silos, water towers, and hay barns so that they set close to a ledge or brink and appear to carry the vertical lines of the ground on upwards, and thus belong structurally to the site, while low buildings crown knolls or rest against gradual slopes. It is important that the various yards and buildings be at least partially visible from kitchen and dining room windows, and the approach from the highway be under a surveillance in the same manner.

THE FARM DRIVEWAY

Probably no single engineering structure is so misunderstood and neglected as the farm driveway, nor is there any other in more constant use.* We motor blithely over improved highways only to get stuck in our own dooryards. It is useless to attempt keeping farm roads in shape for wet weather service with a harrow or drag if they are nothing more than paths made by vehicles without surfacing, drainage, and grading. It should also be remembered that ditches along the side of a narrow road are merely something to slide into when the surface is slippery, and that we cannot copy highway methods on a miniature scale and make the result accomodate a full scale vehicle.

The drive should be laid out close enough to the contour so that deep cuts and heavy fills will not be necessary in order to avoid grades exceeding six per cent. In the majority of cases this means a winding road, and sharp curves near the buildings.

The first step in the construction of a private drive is to divert the water which would otherwise flow onto the road by means of dikes and dispose of it through culverts or tile lines. This is rarely a large job because a side hill road of this character is not likely to be a feature of an unterraced site, and on flat land the dike required will be little more than a low ridge parallel with portions of the track near the bottoms of grades. The driveway is usually narrow because the traffic over it it not likely to develop much necessity for vehicles passing one another, and the rates of speed are necessarily low; therefore economy in first cost and ease of maintenance are prime considerations. The overall width need not exceed sixteen feet except at intersections and on sharp curves, while the gravel track is sufficient when laid "eight by eight" which means eight inches deep and eight feet wide. The best method of building the gravel bed is to cut the center two inches while the centers of the wheel tracks are cut down one foot; if built with the flat gravel bed the rutting of the wheels while the road is new will cause it to assume this shape. The implements needed are the plow, slip scraper, fresno, and V-ditcher.

The section of the road bed is slightly concave so that the center is not less than one, nor more than two, inches lower than the outer edges, this carries the run-off from rain down the center of the track. Erosion is avoided by the use of coarse gravel for the entire track, with extra coarse gravel or small cobbles set down this center, and carefully sodding the sides with buffalo, bermuda, blue or gramma grass. Maintenance consists of drawing

*Our surveys indicate that farm driveways are so constructed that in 26% approaching cars on the highways are invisible; 17% are difficult to enter because of bad ditches or culverts; 33% plantings or embankments cause drifting of snow or sand; 92% cannot be negotiated without chains during rainy weather. These farm driveways are not on the side roads of Oklahoma, but along Albert Pike Highway where pavement or gravel practically assures year around passability. Despite the fact that they are in daily use 90% were laid out so that a car could not leave the premises without having to back and tack on ground more or less covered with old nails, barbed wire and broken glass. Tidiness is not noticeable around these highway homesites. 22% had garages set so that a car must be backed and tacked to avoid hitting trees or buildings. 60% contained deep ruts which throw the car heavily from side to side. 17% climb directly over sand stone ledges.

the gravel into the ruts with a road drag (or raking it in by hand on short drives) and keeping the sides neatly mowed. In sandy locations the surface can be made flat as the problem of drainage is reduced by the higher absorption, but it must also be deeper and of courser material than where the subbase is clay or loam. A fringe of shrubbery or trees along the route is likely

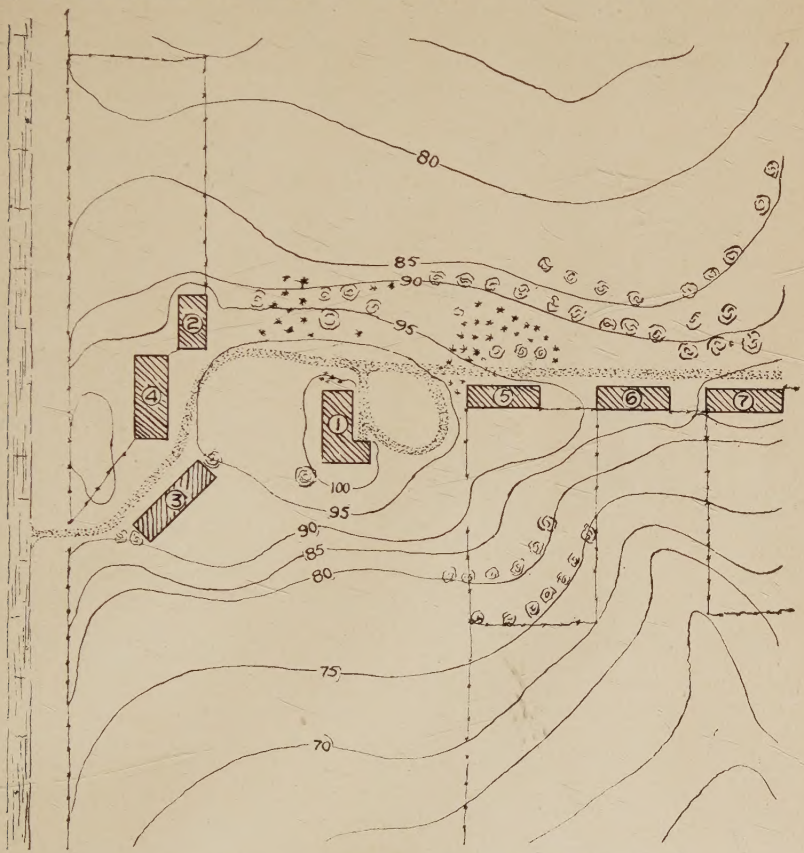


Fig. 3. Farmstead Layout Suitable to a Steep Knoll.

The arrangement of the building group depends on three factors: (a) The topography of the site, (b) The points of the compass, and (c) The relative positions of highway and cultivated fields.

1. Dwelling located on highest elevation and approached by driveway.
2. Haybarn within easy trolly distance of horse and cow stables, and above them so hay car rolls by gravity.
3. Machinery shed north of drive with space for standing machines.
4. Horsebarn opening to well drained lot on the northwest and close to machinery parking ground.
5. Dairy barn west of dwelling and opening onto a steep slope.
6. Poultry runs on well drained soil.
7. Sheep lots on land too steep for profitable cultivation.
8. Swine on lower slope leading to alfalfa pasture.

The first engineering feature which should be laid out and constructed is the farm driveway. The orchard northeast is planted on the contour so terracing will prevent the loss of soil through erosion.

to cause drifting, therefore the road should plunge directly into clumps of trees bordered by shrubbery and come out on open windswept areas. Cuts along an east-west route are especially to be avoided unless protected by shelter belts of trees to the north and south. If feasible, keep the farmstead drive away from the fence lines. Nothing is likely to be more troublesome and untidy than a roadside fence unless it happens to border a pasture or stockyard. The approach to the highway ought to be free from shrubbery and plantings such as would obscure the view either way. In these days of high motor speeds we must needs enter the highway with care and dispatch;

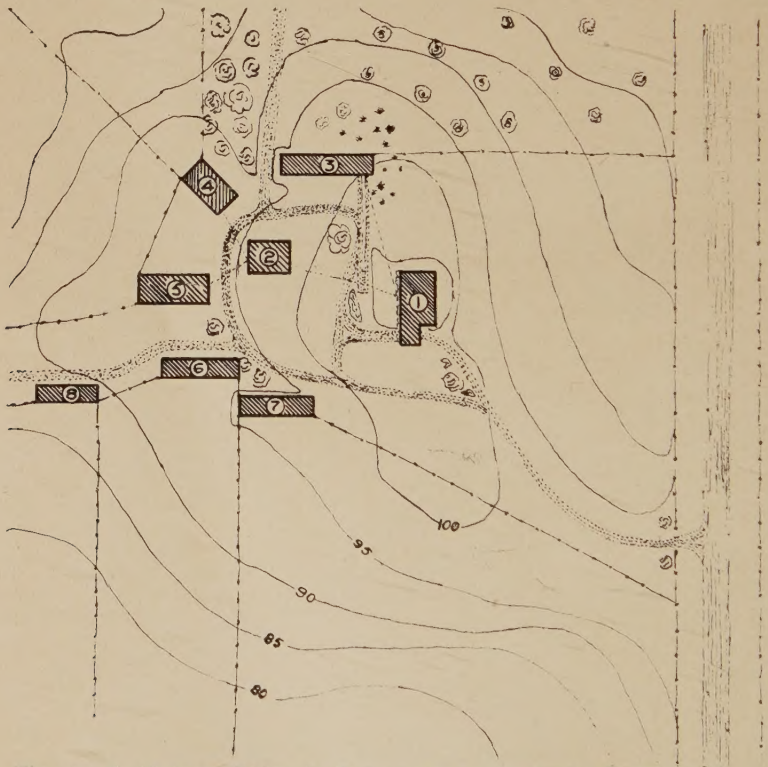


Fig. 4. A Narrow Ridge is Frequently a Desirable Building Site.

It is much more important that the dwelling occupy a commanding site and be either east or west of poultry and livestock quarters than to be close to the highway. Odors and flies are certain to be much more annoying if stables are north or south of the house.

1. The garage is incorporated with the dwelling and the drive borders the area devoted to lawn; there should be no clean front yard with a frankly dirty back one, but the same standards of cleanliness and beauty entirely surround the residence.
2. Haybarn close to stables and drive.
3. Machine shed set at right angles to the contour so that by tacking to the left gravity helps us back the implements in, and by a corresponding tack to the right they roll downhill, but can stand in any position without blocking the wheels.
4. Stables for horses, cows, or both.
5. Poultry east of, and down hill from the house, fenced from the lawn.

CORRECTION: Cuts for Figures 3 and 4 are transposed.

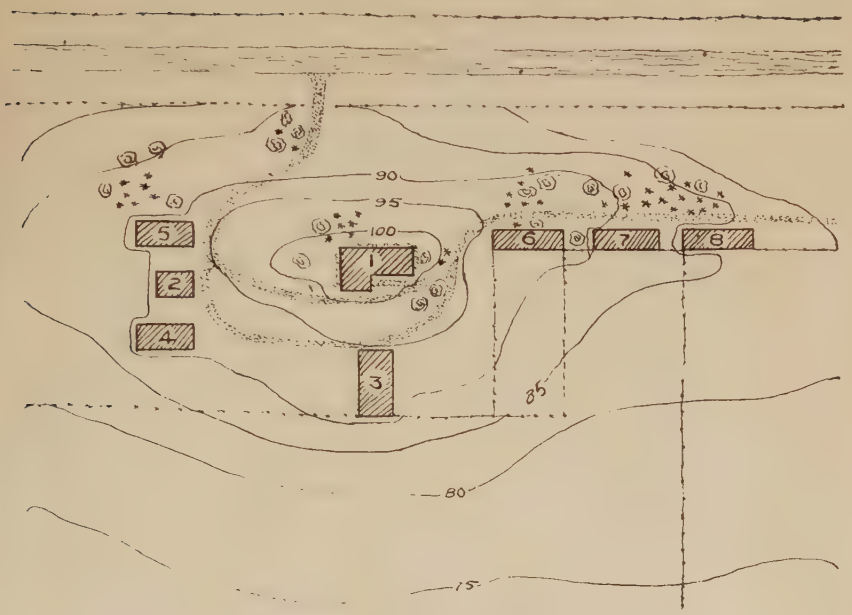


Fig. 5. A North Frontage is Desirable in Oklahoma

If we have a slope south of a highway the opportunity for attractive lawn plantings is increased because of protection from south wind; our best shrubs and trees develop on the north side of a building.

1. Residence on the crest of the knoll and protected by conifers from the northwest wind, with deciduous trees to break the hot afternoon sun.
2. Haybarn between the stables.
3. Machinery shed south of the house.
4. Horsebarn close enough to encourage leaving implements at the shed.
5. Dairy barn on well drained soil; a basement barn can be readily built.
6. Poultry close enough to be seen from the kitchen.
7. Sheep on the southeast slope.
8. Swine near land level enough for rape and alfalfa.

narrow gates are best set at least three car lengths inside the highway to permit ease in making the turn, while wide gates afford sufficient clearance when on the boundary line. The position of the entrance is clearly indicated by tall posts, poplar trees, and white gravel so that speeding cars may be controlled accordingly, this is especially important at night. The gate post is one place where the use of whitewash is amply justified.

The completed driveway should meet the following specifications:

1. The entrance should be plainly indicated by columnar trees or gate posts.

2. The driveway width must permit two cars to pass; a minimum of 16 feet.

3. *The track to be graveled or paved at least eight feet wide on the

*The most common error in surfacing farm driveways is the utilization of too fine a material; the best gravel runs from quarter to three-quarter inch in size, and in sandy localities the larger gravel is very important, while on clay the use of fine stuff is justified. The material as spread ought to vary from fine to coarse because a better packed track will result than where one size only is obtained.

straight-away and enough wider on curves to provide for the departure from trailing of the rear wheels.

4. From a closed loop so that any car can enter and leave the premises without backing or tacking; in some cases the loop may be around a clump of ornamental planting, or a circuit of the buildings; but it should be easy to see and follow either day or night.

5. The garage drive ought to have the wheel tracks provided with rails about three inches high and forty-six inches apart, of concrete, to guide the car when backing out of the garage and this guide track is best if tangent to the regular driveway so that tacking of the car is slight in coming onto the drive, and we can go ahead on the loop.

6. The garage tracks ought to be concrete twelve inches wide and five inches deep leading to a concrete floor in the garage, the space between guide rails being carefully filled and sodded.

7. A by-pass should reach the dwelling if the garage is not incorporated with the house, so passengers may alight in shelter.

8. Keep the surface flat except on the curves where the outside ought to be raised somewhat to assist in turning the car and holding the gravel. The center of the gravel to be slightly lower than the wheel tracks so what water falls on the drive will run down the center and spread evenly both ways at the bottom of the slope where it may drain slowly away one direction or the other.

9. If the driveway must cross a depression, build the dyke so high that the heaviest rain will not overtop it and carry the water under the driveway by means of a drop culvert or penstock and drain.

10. Do not plant rows of trees and shrubs along the drive.

THE CONTROL OF EROSION

No single necessity due to location is so much to be deplored as that requiring the farmstead to set on flat ground, unless it is in a depression; therefore it might be taken as a working premise that the problems of erosion are indivisably linked with the utilization of a desirable building site, and must be promptly and adequately dealt with at the beginning if serious loss is avoided. The instant we strip the native vegetation from the surface there will occur many provoking little gullies on the slopes, and the loss of much surface soil. Stone ledges alone seem exempt. The remedy is simple and can be applied with little expenditure of capital by utilizing otherwise unproductive time in building terraces. There are three types of terrace if we accept the general use of the term (although two of them are really not terraces at all but levees, balks or dykes). The first is the bench terrace which consists of one steep face surmounted by a low dyke and a level top. It is built only on steep slopes or where the land has a high relative value. The second is the sod ridge, sometimes called the narrow ridge, and is built on land of low value where farm practice can parallel it with small farm machines such as the walking or two-way plow, the single horse drill, and mowing machine. The third is the Mangum, or broad base terrace over

which large machines can readily pass and cultural processes are parallel with the fences. In farmstead development the first two are of greatest importance.

To the uninitiated it would seem almost paradoxical to seek a rough, sloping site and commence making flat places on it for garden, lawn, and orchard, yet the importance of drainage and the safety from flood is so important that these methods are justified for the purposes mentioned.

The bench terrace is highly desirable adjacent to the residence for garden and lawn purposes because it is readily irrigated, never erodes, and has certain artistic possibilities. Where rock is used for facing it is well to fill the joints with lean mortar to prevent vegetation growing therein unless the scheme of development will permit considerable hand labor in weeding and setting in grass and plants. Good native sods carefully laid will need little attention beyond a few hand mowings with sickle or corn knife to discourage weeds, while the grasses are recovering from the shock of transplanting.

The Garage Approach

Concrete tracks and guide rails assure safe backing of the automobile day or night. The guide rails should be *inside* the wheel base instead of outside as frequently constructed.

The protection of yards and paddocks where livestock keeps the ground bare consists of building dykes about every two or three feet vertical interval, these dykes having a gradient of approximately one-half per cent, thus preventing sufficient accumulation of water to cause deep mud, yet retarding the flow so that cutting is negligible. The result is dry yards and the conveying of manures to the ground beyond the fence. The sanitary advantage of dry lots is frequently underestimated even though the feeding and housing facilities are well provided for, and the leaching of manure dropped within these boundaries is often a serious economic waste. Barnyard dykes should empty onto cultivated land, either directly or by means of a baffled ditch, and it is amazing the results such disposal many times produces in the way

of increased yield and early maturity. With the gradual decline of our natural fertility these means are becoming of increasing importance, and the time is not very remote when our existence on the land will depend on their practice. It might be well to note that the gradient of the dykes beyond the yard limits must be not greater than one-fourth per cent, in fact if level the saving of fertilizing elements is enhanced; a ditch becomes self cleaning at about one-third to one-half per cent and we do not want self cleaning on tilled ground.*

THE FARM WATER SUPPLY

No single factor has so important a bearing on our standards of living as the water supply, nor does the presence of wells and cisterns insure the advantages and economics sought. We rely too much on cisterns for soft water, wells for hard water, and providence for good health. Cisterns are usually polluted by organic matter and dust from the roof, leakage through the platform, and insects creeping through the curb. A well is usually adequate so long as we carry a bucket and pump by hand. But when we attach a real plumbing system to it and place the water under pressure at the faucet, stool, bath, and sill cock we are likely to find the supply too hard for use in the hot water back of our stove and too scant for continuous service. But wells do exist which can meet the requirements and where found are almost priceless treasures.

There are few places in Oklahoma where some irrigation, varying from sprinkling with a hose to flooding a dyked flat, is not feasible and desirable. Moderate sprinkling is readily accomplished from the sill cock supplied from the house system, but extensive sprinkling, ditch irrigation, and flooding can be provided for only by high capacity pumps or large gravity reservoirs. Owing to the fact that we have much more economical and adequate means of securing soft water for house use, the cistern will not be discussed. This leaves the two general sources of supply to be considered; first, wells and springs; second, ponds and creeks, giving ground and surface supplies respectively. The essentials of well protection are the clay collar, masonry curb, masonry pump pit, and concrete platform with grassed yard properly fenced from livestock, and located away from the building site to reduce the danger of underground contamination by seeps and fissures in the structure containing the water. If the water is hard it can be softened by methods hereinafter described. The importance of pond development for domestic water supplies is not yet fully appreciated in Oklahoma, and many farm homes are now using water too hard or too scant for the purpose to which it should be utilized. In the first place, there is the fear that pond water may not be safe for drinking, and second that the processes of purification are too complicated to be undertaken as part of the routine incident to the maintenance of a modern home. There is no basis in fact for either of these fears. The pond sand filter properly built and maintained offers a purity and clarity comparable with good well water, and superior to most cistern water, and

*Write for Circular 218, "Terracing in Oklahoma."

the zeolite softener requires no special skill or attention to secure a softness far surpassing that of the average cistern we have obtained samples from. In some cases it will be desirable to treat pond water with soda ash and lime, but even this process is no more complicated than mixing the ingredients for a batch of biscuits, or the breaking of water with lye and soap on wash day.

A brick filter in a cistern removes some discoloration and sediment, but permits the bacteria which may be present to pass through with little apparent hinderance; while the sand filter in the bottom of a pond gives results that are little less than amazing. Not only does it remove the sediment, but test after test has proven conclusively that it removes baceria as well. A new sand filter permits sediment and bacteria to pass through a short while, but soon the grains of sand become coated with a slime incident to the growth of harmless nitrifying bacteria, and through this slime the bacteria we fear cannot pass. It should not be taken, however, that water in a pond polluted by livestock standing along the edge in the summer and by yard drainage in the winter, is safe to drink. The pond ought to be very carefully protected against pollution by barnyard manure or privy vaults and the filter be expected merely to clarify the water and decrease the bacterial count to a safe figure so that a potable liquid is obtained at the faucet. Water from the filter is stored in a reservoir from which it can be pumped as needed, the flow through the sand being very slow so that complete purification within the capacity of the filter will be assured. The size of filter and reservoir depends on the rate of pumping, depth of water, and turbidity of inflow.

A Concrete Platform

Much illnes straceable to contaminated water supply would be eliminated by concrete platforms as illustrated above. It is estimated that over three-fourths of the contamination in farm water supply is caused by the wash through the cracks leaking into the well.

In some cases water from a pond will seep into reservoir through the sandy clay so prevalent over much of this state and the construction of a filter is not necessary; usually this seepage is so slow that pumping by engine or electric motor will empty the resorvoir and refilling be a matter of hours or even days, yet the seepage is rapid enough to provide all the water needed by the house and foundation plantings if pumped with a windmill, additional irrigation being taken care of with raw pond water from another

pumping outfit. It should be borne in mind that garden irrigation is more economically done by a centrifugal pump using unfiltered water.

The best location for a pond* designed to supply water for house use is in the head of a draw where water can be readily brought to it by dykes, yet where freshets are not likely to cut out the dam and destroy the filter. Placing an earth dam across a slough having a large water shed and depending on a more or less adequate spillway is merely one more way to tempt providence for a loss. The pond ought to be in such a position that over-

The Farm Reservoir

This water is brought from grass land by dykes, impounded in a dry gulch, filtered and used for domestic water supply.

topping of the dam is a remote possibility, and this is never the case where large areas drain into a narrow gully-like creek. The water shed actually necessary to supply an impounding reservoir of this type is small and it is best to reserve a meadow or woodlot for the sole purpose of supplying the water and keep it fenced stock tight and protected against outside wash by dikes. In many instances it is well to utilize the water shed as an extension of the lawn, thus affording a combined playground, woodlot, shelter belt, and hay field. Care should be taken to disturb the surface soil the least possible consistent with the establishment of the desired plantings, as tillage increases the turbidity of the water entering the pond. In locations where the soil is readily carried in suspension it is best to lay out a flat, shallow settling basin and conduct the water slowly into the pond by means of a penstock and line. Overflow of the pond is handled at the opposite end of the dyke and this arrangement avoids the loss of fish usually occurring where the spillway empties directly from the pond itself. A screen across a spillway will prevent the passage of large fish, but small fry is held against it to die in large numbers, by the rush of water.

The pond itself should be deep, in fact it is not likely that it will be constructed so that too great a depth of water can accumulate for the good

*Write for Circular No. 175, "The Farm Pond."

of the filter. A minimum of six feet ought to be carefully assured for the sake of the fish if not for the assurance of a better supply in the well. In grading and excavating great care must be exercised that no shore pools are permitted because these serve as breeding places for mosquitoes when the water level is lowered by dry weather. Mosquitoes cannot make headway in the pond itself if a stock of perch is present, they must breed where the fish cannot reach them. In addition to perch it is well to have surface minnows, crappie, catfish and bass. A stock of fish including all these varieties reduces the damage from crayfish and frees the water from decaying animal matter produced by insects, earth worms, and snails. The shores are given a gentle slope so that rock, sand, gravel, and grass can retain their positions and small fry seek the protection of shallow water to avoid the bass and crappie further out. The presence of turtles and snakes should be discouraged by careful shooting.

Considered as a source of potable water, the pond is best situated if its surface can be swept by the wind and the waters penetrated by direct sunlight, even though this increases the turbidity. Sunshine and air increases the rate of oxidation, thus hastening the purification. On the other hand, fish and aquatic plants thrive best if some shade and wind protection is afforded and the lapping away of the shore is reduced. Trees near the filter outlet and well are likely to cause trouble from their roots penetrating the

(Courtesy of Farm Journal)

Consistency of Design

The house and barn are in the same architectural style and painted the same color. The walk has no trees, shrubs, or plantings so placed as to wet the clothing of the passerby or bury the path with drifting snow.

joints and fissures, therefore the portions of the construction within fifty feet of these features must be kept clear of trees and large shrubs. Whether we especially desire them or not, hundreds of little trees such as willows, cottonwoods, and sycamores will spring up along the shore line and grow with surprising rapidity, soon forming a thicket so dense that sod forming grasses are shaded out. Probably it is best to set desirable trees somewhat near the shore line and preserve the grass turf by mowing. This beautifies the situation, gives shade, reduces the amount of dead leaves falling into the water, and attracts a more careful attention to the water works as a whole.

SANITARY CONSIDERATIONS

There is a real basis in fact for some of the old time superstitions concerning evil spirits and omens of luck; unfortunately our building practice on the farms of Oklahoma has not kept pace with the advance in modern knowledge and we still have too much "evil spirit" in the form of sickness and lassitude. Bacteria and internal parasites are usually transmitted from droppings of an infected animal to the food or drinking water supplied healthy stock, or carried from animal to animal by insects or dust in the air. The whole situation may be summed up roughly by saying that if we adopt feeding methods which prevent animals eating food or drinking water which has been fouled by manure and change pasture at frequent intervals so that close cropping of fouled grass will not be necessary, and in addition place accumulations of manure where it cannot serve as a breeding resort for flies and rodents, we have taken the first essential steps in modern sanitation. To accomplish this we must needs discard troughs, feeding floors, and stock ponds, and resort to self feeders, individual racks and water fountains. Solid manure must be stored in a fly proof masonry pit and liquid manure conveyed

(Courtesy of Farm Journal)

An Example of Good Arrangement

No distinct front or rear to the farm house site should exist, but the same standards of neatness prevail on all sides. Livestock and poultry should be *fenced in*, not out, and fences or guard rails so arranged that digging or wallowing along foundations is impossible.

to a septic tank or liquid tight sump. The pastures must be fenced so that we can turn from the dry lot to one grazing area while the vegetation on the other area recuperates and its surface cleanses of contamination. Not only is alternate pasturing of grass land an advantage for sanitary reasons, but it permits natural seeding of the grasses and retardation of the weeds which thrive on overgrazed land. Our native pastures are rapidly passing away because of a shortsighted and destructive grazing policy. In some cases it is well to consider an alternation of dry lots, especially in certain types of poultry husbandry where more or less picking of earthy material from the dry ground is bound to occur, also for swine owing to their tendency to root in the dirt regardless of the presence or absence of food. In the cases of cattle, sheep, and horses, alternation of dry lots is unnecessary if salt and sulphur are available at all times.

(Courtesy of Agricultural Engineering)

The Village House Adapted to Rural Purposes

This photograph indicates the transition from the village house to the distinctly rural design. The steps have been placed at one side but the conventional front door and porch have been retained.

As mentioned before, the admission of livestock to watershed and ponds is to be guarded against, yet in many cases the use of pond water for stock purposes is economical and desirable. There is just one sanitary way of

accomplishing this end, that is the use of the float tank and fountain. The float tank is covered with earth or straw so as to be entirely safe from freezing and the fountain is placed out away from the fence so that it can be approached from any side, thus discouraging "boss" animals preventing other members of the herd from drinking. The fountain is provided with a guard rail to prevent the voiding of excrement into the water. Damage from freezing is minimized by making the inside with a slope and when the ice is lifted out on cold mornings the fountain fills with warm water from the float tank and the amount drunk is much greater than if icy temperatures prevailed. It is important that a paving of rock, concrete, or gravel be placed for a distance of several feet about the base of the fountain to avoid mudholes and foul conditions. Where running creek or spring water is available it is well to provide an overflow for the fountain, and permit the water to flow continually.

Water as it comes from the pond or well is usually satisfactory for livestock, and if the ground is properly drained, will serve for irrigation supplementary to the rainfall, but it is rare that such water is satisfactory for laundry and bathing, due to the presence of calcium and magnesium carbonates and sulphates which cause curdling of the soap and a harsh, chapped condition of the skin. Furthermore, these substances cause scale in the hot water back and pipes, and may increase the danger to persons susceptible to gall bladder, or kidney stones, if too abundant in the drinking water. For these reasons, it is well to treat the water for the removal of these substances either by replacing them with others having less objectionable characteristics, or removing them entirely by combining with insoluble substances. Water containing limestone, gypsum, and epsom salts is termed "hard," while that having little, or none of these substances is termed "soft." It should be noticed that common salt cannot be removed from water by any means except distillation, and where salty water is obtained from the well or pond it is useless to attempt treating it. The carbonates, which produce scale in teakettles, cause temporary hardness which is removed by boiling or by the addition of lime; the sulphates, which maintain the hard characteristics in the water despite repeated boiling are decomposed by soda ash, leaving in their place substances which do not curdle soap or chap the skin. Softening the water with lime and soda ash results in a reduction of trouble from scale and sediment in pipes, makes laundry work far more satisfactory, resulting in less consumption of soap and quicker cleaning, not to mention the fluffiness and freedom from stain so impossible to obtain with hard water.

The process requires careful measurement of lime, ash, and water with thorough mixing and a period of at least one day to settle out the percipitates because too much lime and ash is almost as undesirable as the substances we are treating to remove, and it takes time for the reactions to become complete. The quantities required are determined by chemical analysis, and the operator soon learns to vary the quantities according to the changes in the water, usually women are better at this than men because the processes of household cookery teach accurate and careful following of instructions.

The softening plant consists of two tanks, one being pumped full while the other settles out, and a sump into which the water drains by gravity to be pumped to the house. *A method of pumping both hard and soft water with the same pump and windmill is readily installed, while better systems utilizing an electric pump for the house service are also obtainable. Where economy of first cost is a considerable item the softening can be done in a single tank but there is greater risk of being without soft water at times.

Another method of water softening applicable where the total hardness is not excessive, is to permit the water to pass through a filter bed of zeolite chrystals. The carbonates and sulphates are taken in combination with the silicate and the water passes on entirely free from any substances producing hardness; in other words it becomes "zero soft." When the combination is complete the zeolite is returned to its original condition by a solution of common salt, and the waste matter is washed out along with the salt in the flushing water; in other words we can continue softening water with zeolite indefinitely providing the sulphates and carbonates are released by salt and washed out when the combining capacity of the zeolite has been approached.

The method of handling the liquid is by piping and valves so arranged that hard water enters at the bottom of the tank, passes through the zeolite and screen into the service pipe for the house. When regenerating is necessary the house pipe is closed, salt is placed on the screen and hard water carries it down through the chrystals and out the flush vent, leaving the zeolite in its original condition ready to take up more "hardness." Usually the tank should be of sufficient capacity to soften a week's supply of water. Zeolite is damaged by steam or hot water, so care should be taken in plumbing that hot water cannot siphon back into the softener.

In a way this may seem complicated and involved, but compared with the processes incident to producing a crop of wheat or making a loaf of bread it is simplicity itself, and no single item will do more to mitigate against the drudgery so often the farm housewife's lot as will an adequate water system.

THE WELL

Very frequently we read of typhoid and dysentery outbreaks in one family, or even an entire community, with the simple explanation "Caused by Polluted Water Supply." Only on rare occasions does the explanation state how the water was polluted, or what precautions should be taken to guard against further difficulty from this cause. Well water, if free from minerals of an injurious or unpleasant character, is our best source for general family supply.

Contamination of cistern and spring water is much more frequent and just as dangerous to health as that of well water, so in many respects the precautions mentioned are just as applicable to cisterns and springs.

*Write for Farm Plumbing Installations.

(Courtesy of Agricultural Engineering)

An Excellent Country Home Approach

Here we have a graveled farm driveway leading to a house of artistic design. We just know by looking at it that it is a rural home designed to meet rural needs. Incidentally, this house was built by remodeling two old barns

While it is possible for contamination from privy vaults and cess pools to be carried some distance by underground streams, the actual danger from these sources is much less than from the three mentioned at some length in succeeding paragraphs. During dry weather deep cracks open in our clay and loam soils, and into these crevices is washed large amounts of surface silt which in many cases contains manure, rotting vegetation, and kitchen slop. A well close to the house or stockyards is in great danger from these sources. Such material renders drinking water unsafe. So in general the well should be at a distance from house and barns, and the ground surrounding it be raised so that surface water will not flow close to the platform. In pioneer days the well was desired close to the house so the housewife could carry from it more readily, but that time has gone by along with the horse and buggy; today an underground pipeline receives the water from a pump having no spout at the well to drip water on the platform and create a slop there.

The second source of pollution is caused by crickets, mice, toads, and spiders gaining access to the curb and drowning; such material makes the water bad tasting and unwholesome. In order to care for the pump connections a five foot pit is necessary, and this should be of concrete or masonry construction, and covered with a concrete platform provided with a cast iron manhole cover and ring. Earthworms rarely work lower than five feet but sometimes they follow crevices along the side of the casing for several feet; to avoid this the upper part of the casing ought to be packed with clay and sealed water tight with plaster and asphaltum. Air can be admitted to the pit through a small pipe with the end screened insect proof. The best curb is tile, brick, stone, or concrete; steel is not so desirable, and wood should never be used, it decays and permits the entrance of underground creatures.

The third source of contamination is from animals and poultry defiling the platform; even a concrete platform with a good manhole cover and pump pedestal is likely to permit some droppings to wash into the well, especially if water is drawn from a spout at the pump, which it should never be. For this reason the pump site should be fenced stock and chicken tight, and the place made attractive by plantings of honeysuckle, roses, buckberries, or other shrubs and climbers, and the ground covered with sod.

In those situations where it is not feasible to install anything more than a rope and bucket, the well can be protected adequately by setting a single sewer tile with the bell up to enclose the casing of a drilled well, and fitting it with a homecast concrete cover, then dig out the loam or sand around the casing and pack to the surface with clay, raise the level a foot or so above the surrounding ground and slope this surface for some ten feet away, and fence stock tight. Water from the bucket is poured into a funnel supplying a pipe sixteen feet long leading to a trough or tank outside the pump site fence. And even in this case the water will seem to taste better if a few hardy flowering plants are set inside the fence where they can be cared for and protected against stock and chickens. After drawing water the bucket is suspended from a hook on the derrick and the cover put in place.

(Courtesy of Agricultural Engineering)

A Well Laid Out Farmstead

Here is a comfortable home with the buildings properly placed. How much more attractive it would be if it had uniformity of style and skillful grouping of plantings.

THE USE OF NATIVE MATERIALS

The actual productive time utilized in the seeding, harvesting, and garnering of crops rarely exceeds one hundred days per year, while in specialized lines such as poultry and dairy there are portions of the working days which are not contributing to the cash income. In other words, so far as improved standards of living are concerned, this time is lost. Evidence of this loss is reflected in the neglect of our native building materials, cheap frame buildings on farms close to sand, stone, gravel, granite and clay. We find creosoted pine posts being set in localities where osage orange, red cedar, black locust, and hardy catalpa grow readily; and buildings using studding and rafters of southern pine among standing trees of native oak, poplar, hickory, walnut, ash and sycamore.*

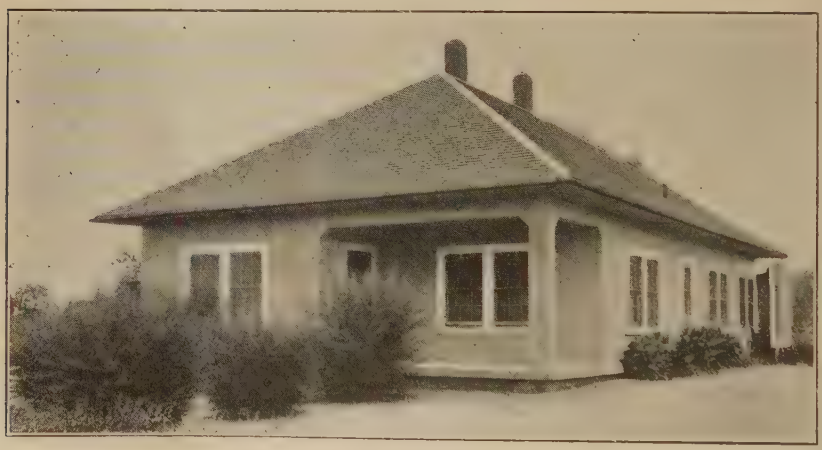
An Excellent Use of Native Material.

Even though the wages earned while making rock, sand, gravel, and native timber available for building purposes are low, such wages are better than nothing. Three years is not too long a period in which to prosecute the erection of a permanent and useful building. About the only works of man which can be both quickly executed and enduring are those of destruction; real construction requires time, thought, effort, and skill, and to these may well be added the urge of appreciation and affection.

Cash should be expended only for those items necessary for the utilization of what we have such as cement, paint, steel, copper, and millwork; our walls and roofing materials ought to reflect thought for economy, permanency, safety, and beauty. Why build a stone wall and roof it with shingles shipped from far away, when steel, sand, and fire resistant roofing are available close

*Our building program can be whimsically summed up somewhat as follows: On Monday we decide to build, buy the materials on Tuesday, lay the foundation Wednesday, set up the framing on Thursday, lay the floors and trim Friday, put on a priming coat Saturday and look for a buyer Sunday. Within a year the building looks shabby, the rats are throwing mounds of damp earth against the floor and the termites are mining the sills, the roof leaks, the plaster cracks, an old shirt replaces a pane of glass, and we view another typical Oklahoma shack.

by? A building as a whole is little better than its roof, and a tinder roof is a desperate hazard. In the northeast we have limestone, flint, and various forms of cobblestone; in the southeast is stone and ceramic material in abundance; in the central part we find much excellent sandstone, gravel and sand, while in the west is granite, sand and gyprock not to mention clays well adapted to the making of adobe and pise walls. There is no part of the state where clay products cannot be shipped with shorter hauls than the lumber now being used, and the preponderance of inflamable construction being erected is an unfortunate result of habit. Let us realize that concrete over tile makes dry, durable floors; that tile, brick, stone, and concrete build durable walls; that steel for windows is preferable to wood because free from shrinkage, and that steel, metal lath, and concrete make a durable roofing base on which to lay asphalted felt, tile, or metal roof covering. If we pick up each field stone turned out by the plow we are not merely improving the tillage conditions, but collecting valuable construction material as well. Let us hasten the day when our fire loss, now our largest source of destruction, will



A Durable Prairie Cottage.

Probably no other style of domestic architecture will agree more harmoniously with a setting of straight line plantings, and an indifferent lawn, than the Prairie Cottage. For this reason it is much used in tenant house design. The absence of jig-saw work, the orderly fenistration, and well balanced proportions give an unusual sense of comfort and durability. Fire resistant shingles, stucco walls, and concrete foundations and sub-floors do much to meet the severe conditions of our wind-swept plains.

be the smallest; we are in a climate very severe on wood and paint, a climate which makes protection against wind, sunshine, and rain more important than insulation against extremes of temperature; our summers are such that it is more important a building be difficult to burn that be low in first cost or conform in type to ideas imported from northern, more humid, states.

Another lesson we need to learn is the futility of many present types of construction and fastenings under certain circumstances. Probably one of the

common errors in the use of wood outside the building and in certain parts of the framing is the use of wire nails. Examine any weatherboarding or cornice trim and note the pulling and rusting of the wire nails; note the splitting where nails are slant driven to hold studs to the sills and rafters to the plate; also note that it is almost impossible to drive a wire nail into a hickory, oak, or walnut timber. We must use bolts and metal straps or fishplates to fasten structural members in place, and screws to secure outside trim, if real durability is sought. A masonry wall must rest on a footing placed below frost and be reinforced somewhat against movement of the soil due to a change in soil moisture, if we are to avoid cracked walls, settling out of plumb, door-frames twisting out-of-square, and porch floors pulling away from the adjacent walls. Where frame construction is used all sills and wooden lintals ought to be treated with creosote, carbolenium, zinc chloride, or other effective preservative; no wood should be used structurally close to the ground where soil moisture may encourage the attack of termintes and fungi, unless thoroughly treated.

Is a Building Better Than its Foundation?

We have many excellent buildings in Oklahoma being deformed and brought to an untimely end because of poor foundations. This illustrates an effort to preserve the building and eliminate damage from eve water by the use of concrete outside the foundation line. A better method would be to hang gutters and conduct the roof water away through underground tile and support the building on an eight-inch concrete foundation carried by a twelve-inch footing placed below frost.

THE REDUCTION OF FIRE HAZARD

It is almost useless to combat a fire after it is well started in an inflamable structure; our energies need be directed first to those measures which render fire starting improbable; second, to those measures of obtaining control of the blaze and preventing its spread to other property. Water systems as usually built for farm service have neither the pressure nor capacity for adequate fire fighting, but they may be of service in preventing a small fire from gaining headway or being transmitted to other buildings.

The majority of our fires originate in defective chimneys. Any chimney built on top of a cupboard or shelf, with no lining, and set close to, or against

the wooden timbers of the roof, is a fire menace. Set the chimney on a stone or concrete foundation and build it straight up. Flue lining is manufactured from fire clays and comes in joints about two feet long and in such sizes as to match up with brickwork without cutting, and is an excellent safeguard if the mortar commences to crumble. The chimney should be laid in cement mortar, using not to exceed one fifth part of hydrated lime by measure, or one tenth by weight.

The greatest danger from a chimney rests at the place where it emerges through the roof; the mortar and brickwork there will be ready to tear out and replace long before there is evidence of deterioration below. Take a nail and pick at the mortar around the flashing and if it is at all loose, tear the top down to a sound brickwork below the roof and rebuild. A chimney top of clay or other non-corrosive material improves the draft and reduces the danger from sparks igniting the shingles of the roof.*

Our next consideration is the roof itself; it is useless to build masonry walls and leave the roof of a highly inflamable material and expect in this way to reduce the fire hazard. Wooden shingles, during our prolonged

The Home of an Oklahoma Master Farmer

droughts are readily set on fire by chimney sparks, or flashes from lightning; and as flashes of lightning usually occur just prior to rainfall, the roof is fully ablaze before rain dampens the roof sufficiently to check the fire. We should frankly turn our attention to roof coverings of clay products, metal, slate, and cement. Despite their higher first cost, their longer period of service compensates for the heavier outlay. There are many jokes concerning lightning rods; but the statistical evidence is very strongly in their favor, and if the simple rules of installation are followed, there is no doubt but that they reduce the hazard from lightning to almost nothing.** It is especially important that the rods have points above the chimney, and the

*If we are using soft coal, salt should be thrown on the hot bed of coals about once a month; the fumes ascending the chimney loosen and disintegrate the soot and thus avoid the danger of the chimney burning out. If the soot in the chimney takes fire the danger can be reduced by putting salt in the stove in case hot coals are present. Otherwise, salt should be dropped into the chimney from the top. Water thrown into a hot chimney may reduce the fire, but also checks and cracks the masonry, thus doing much damage to the brickwork.

**We have reason to believe that fires attributed to lightning which burned rodded buildings would not have occurred had the rodding systems been in good repair.

rods lead deep into moist earth. Rods may be copper or galvanized iron but the installation should comply with the instructions issued by the government.

If a telephone line is connected to the house, a lightning arrester may be installed on the outside wall of the house to shunt any extra heavy flashes directly to the ground; it should be kept in mind that the arrester is useless if the ground rod does not enter moist ground so that the flash can be dissipated in direct contact. There is no appreciable fire hazard from a telephone whether the arrester is installed or not, and the usual fear of lightning coming in on the wires is groundless, although an unprotected phone may be burned out by residual current.

Store matches in a mouse tight metal container, such as a coffee can with a tight lid; mice and rats sometimes fire matches near their nests and thus

An Ohio Farm House in Oklahoma

There is something about the American farmhouse as an architectural style which seems to suggest comfort and stability. In this state, however, the tall lines of these houses make tree groups appear short and scrubby, therefore is not suitable for those sections where tall trees are not readily grown, but there is one feature which all styles hold in common so far as landscape treatment is concerned, and that is massing of plantings in groups with stretches of unbroken lawn. Every farm home ought to have its lawn so arranged that it can be readily mown. To do this requires the filling of the corners with shrubbery and making the outlines of the lawn of sufficient length to permit ready guiding of the machine. If drives and walks must cross these spaces build them so the mower can pass over them without delay or damage.

cause fire between the floors or walls where it is difficult to detect or combat. If a frame house is being built it is well to fit pieces between the studs on which to lay brick or sand bags to act as fire stops, thus preventing a fire going rapidly upwards between the lath and weatherboarding. It is well to lath with metal lath and plaster with cement plaster over the furnace and behind the cook stove. Plasterers do not like portland cement plaster as well as they do gypsum plaster because it is brashy to handle with a trowel, but its use on metal lath for fire protection should be insisted on, gypsum being used elsewhere.

If electric current is used, be sure and use fuses on the circuits instead of pennies, nails or pieces of copper wire. Put up a cabinet near the fuse

box and lay in a supply of fuses so if a fixture cord is short circuited the fuse will blow and the chance of a bad fire is avoided. More than one fire occurred because somebody forgot the electric iron, or knocked the insulation off the fixture cord. Light your electric lamps from switches on the walls, there is less danger of damaging the cord, and do not take heavy current from lamp sockets, but use convenience outlets from the walls supplied by the extra heavy wiring required.

It makes our fire hazard much greater to put hay in a loft over livestock; in this climate a heavy overhead heat insulation is unnecessary. Place the haybarn away from the stables, rest the hay on the ground, and carry it to the stables with a hay-track and car. Place the grain upstairs, using a small elevator for lifting, and spouts for bringing it down. Grain does not spread fire, therefore the hazard from stored grain overhead is very low.

It is well established that metal covered buildings properly grounded are to all intents and purposes lightning proof. Grounding is accomplished by metal rods attached to eves and siding with their ends sunk deep into moist

A Typical Oklahoma Farm House

Notice the jig-saw work adorning the porch, also the total absence of a path indicating any use of the front door. Only seven houses out of the hundred counted consecutively seemed to make any use of this entrance; a stranger unfamiliar with farm life might knock at this door, but agents, neighbors, and relatives never do. The normal farm house entrance is at one side or the rear where the automobile may approach.

earth. If animals are fed at the haybarn, leave the sides open so that escape is easy in case of fire. While spontaneous combustion does occur, the majority of fires attributed to it are in realty caused by cigar and cigarette stubs. Few men firing a barn are very willing to confess it, so spantaneous combustion becomes the alibi. Good locks and barred windows to keep careless transients from sleeping on the hay will greatly reduce our fire losses so far as stored hay is concerned.

Where water pressure is available, the automatic sprinkler is the greatest single measure against fire known to modern protection. The sprinkler is merely a fused sprayer to go into action in case excessive heat comes against it, and if the water supply is adequate the results achieved are remarkable. The pipes are installed overhead with sprinklers at frequent intervals, and no doubt such installations will become quite widely adopted as farm water supply systems are developed, and electric current becomes

available. The pipes are air bound until a sprinkler fuses and permits the air to escape whereupon the pipes fill with water. This eliminates trouble from freezing.

Pine and cedar trees close to a building are a source of danger because at times such growths become quite inflamable. It is best to keep windbreaks of conifers fairly well away from haybarn and residence unless precautions are taken to keep dead material cleaned out and the trees in sappy, healthy condition. Mowing of the weeds and grass around buildings helps, as the fallen material becomes damp and prairie fire is held in check. The foundations under frame buildings should go above ground far enough so grass fire would not be likely to creep into the weatherboarding. If buildings stand east and west from each other the danger from fire spread is lessened because our winds are more frequently south and north than distinctly east and west.

Another Little Town House Out in the Country

We seem to go to town for our ideas of architecture and arrangement just as we do for our sugar. The pillars supporting the porch are adequate in size for many times their load, and in the matter of durability are entirely out of keeping with the remainder of the structure. There is no beaten trail to the front door, nor provision for water, furnace, electric light, and frost proof storage. Oklahoma is cursed with an increasing number of small homes made to sell rather than to live in; these buildings are disgustingly garish in design and shoddy in construction, and like all crimes they have a demoralizing effect on the popular taste and their unfortunate influence is creeping into rural practice.

LANDSCAPE ENGINEERING

There are very few attractive farm homes, in fact the majority are hideous in appearance, untidy in maintainance, and inconvenient to work in. Even in those cases where the individual buildings are well built and in good repair the group as a whole is displeasing from an artistic point of view. "What is right, looks right," is amazingly applicable to the design of farm buildings and the layout of their surroundings. An architect may design the house, some farm equipment firm furnish the barn plans, and a landscape gardener arrange the plantings, yet the final result be a heterogenious mess.*

*That farmstead reminds us of the student's humbug which had a beetle's head, a butterfly's wings, a hornet's abdomen, and a grasshopper's legs.

Just as a purebred herd is more pleasing in appearance than a motly mixture, so is the farmstead improved by adherence to one style of architecture. When we place a red, gambrel roofed barn close to a white, hip roofed house, with a shed roofed poultry house close by a gable roofed garage, no amount of grading, mowing of grass and planting of shrubs will ever make the place beautiful in the full sense of the word. If we must resort to different styles, then care should be taken to so place the buildings that they appear to belong in different groups, even though we walk further in doing chores. Approximately one-third of the cost of a passenger automobile and one-half the cost of a dress suit is expended to secure beauty of line and color. Can we afford to neglect it on the farmstead?

The styles of domestic architecture are the result of environment, and a careful consideration is necessary of the individual situation before a choice is made. Steep slopes of the roof are indigenous to climates with heavy rainfall; low walls occur in cold climates, high ceilings are desirable in hot weather; in warm climates the windows are narrow, tall and set high in the walls, while in dark, foggy situations windows set in groups and are wide in proportion to height.

Hot climates with little wind movement developed the single and double story, high walled, wide eaved, types so pervalent in our Imperial Valley and in Egypt, while on the windswept deserts originate the low, bright colored walls, and low pitch roofs, with a practical absence of eve and verge. For these reasons a situation excellent for a Swiss Chalet would not be at all desirable for a Spanish Moor; nor can we with propriety set Dutch and Southern Colonials side by side. Not only do climate and terrain play an important part in the development of these styles, but the habits and religion of the people as well. In England can be found the influence of Italian architecture brought home by travelers, in Florida we find Andulusian motifs far from their native habitat brought here by Spanish pioneers. Furthermore, these styles indicate pretty clearly the general cultural training of the designers, as can be noted by comparing the English Colonial with the American farmhouse.

Strange as it may seem, there is little relation between taste and income. Some of our most beautiful domestic structures were designed and built by people of limited means, while many of our most outrageous architectural monstrocities are homes of wealthy people. The mere employment of an architect does not assure a home in good taste, the architect can only draft what the employer desires and is willing to accept and if the employer is a man of poor taste and obdurate disposition it may be almost impossible for the architect to produce for him an artistic design. Yet the selection of the style is properly the function of the client just as we select the music for our phonograph, and it is just as important that we study to appreciate good architecture as it is that we appreciate good music. It is very rare that we enter a nicely designed farm home and find a collection of cheap, jazzy records, somehow these things do not seem to go together. And of course

after we have chosen a style it is well to have an artist produce it for us if we are unskilled.

Just what constitutes "good taste" in farmstead design? The answer can be summed up in ten general rules which should be considered as guides to study and investigation rather than inflexible laws permitting no exceptions;

An Excellent Utilization of a Natural Building Site

It is rare indeed that we find a better example of picturesqueness, uniformity of style and consistency of grouping than is illustrated by this view looking westward at one of the choice Oklahoma farmsteads. Note the well drained building site, easily mown lawn, and uncluttered arrangement.

1. Choose an architectural style and adhere to it; even an artist has difficulty in mixing styles and securing good results. A house having an Italian door in a Colonial frame under a Dutch roof, accented with a French chimney may not work out well.

2. Choose a style in harmony with the climate and landscape. A Spanish Moor will not look well in the woods nor an English cottage on a bare hilltop.

3. Avoid ostentation; the front and back yards should have the same degree of trimness and thought for appearance, in fact the quarters in which we do most of our work and spend most of our time should receive the greatest attention. A bold frontage designed to conceal a disreputable patio is neither modest nor sincere.

4. Use straightforward lines in design; the house should not look like a barn, nor the barn like a house.

5. Make the service of the building the prime factor in its design; a front porch is poor taste in a dwelling which cannot afford running water in the kitchen; and a fireplace is a useless luxury where cordwood does not grow.

6. The building should reflect the means of the owner; a day laborer ought not to attempt the financing of an Italian villa, nor a wealthy farmer live in a sod hut.

7. Avoid numerous details of adornment; the rural building should rely on just three elements for its beauty: proportion, texture, and color. In proportion we combine the elements of height, width, and depth; in texture

we consider the appearance due to brickwork, rockwork, stucco, and lap siding.* In color we avoid adjacent masses of clashing hues like blue and red, and seek harmonizing combinations such as brown and green. Our best color combinations are suggested by the dry soils of the region, and the various outcropping rock ledges. Excellent body and trim color combinations are suggested by the tints of compact and loose dirt in the highway.

8. Do not combine materials of great difference in structural durability; in a porch the stonework need go no higher than the floor, and a shingle roof over a masonry wall is like a canvass top on a high-priced car.

9. Do not use imitations; a fake chimney with a window in it, a roof thatched with shingles, half timber construction imitated by inch boards tacked on the outside. Blinds or shutters which will not close, or cover the window properly if they did, are hollow shams, and ought not to be resorted to either for purposes of sale or adornment.

10. Do not attempt to duplicate exactly the farmstead of a neighbor; each farm home should reflect to some degree the hopes and individuality of its inmates; duplication of houses and layouts tends to give a mechanical sameness so distressing to the observer where corporations have erected workmens cottages in long rows along straight streets, each the exact duplicate of a single design.

A Design Suitable to the Plains

On the hot wind-swept plains of Southwestern Oklahoma the high ceilings, closely trimmed eaves, and pleasing roof lines of Spanish domestic architecture is especially appropriate. An open lawn space with a few yucca and perhaps a hardy cedar or two, is sufficient for an artistic and natural setting.

METHODS OF CONSTRUCTION

The stability of the walls of a building depend on two factors, one is the footing, the other is the lateral support of its walls. The width of the footing depends on the weight it must support and the type of soil on which it rests; no footing is secure if it is not below frost, or if erosion can cut near or under it. For two story walls the footing is generally twelve inches wide if standing on shale, sixteen inches on sandy clay, and even wider on

*A red wall of smooth finish gives a garish effect, while skintled surfaces of red brick are pleasing, the difference is due to the texture.

clay or sand. Clay, when wet, has a tendency to ooze out from beneath a footing in a manner not indicated by its firmness when dry.

It is well to reinforce the footing with steel because settling of the soil may compel the footing to act as a bridge across some portions of its length; in other words, a footing under a foundation is similar in point of constructional design to a lintel over a door or window. To prevent the wall from bowing or tipping over, it must be supported either by frequent changes of direction or by pilasters. In many cases partitions can serve as pilasters where distances do not exceed twelve feet. In frame construction the plate and sill fastenings together with braces for floor or roof take the place of pilasters in masonry walls. The thicker the wall the fewer the pilasters needed, also a low wall does not need as many as a high one. The builder should adhere to the recommendations of the association representing the type of material used, as to structural details.

Avoid the installation of tilting windows; sash should slide up and down, with counterbalances concealed in the casing to make manipulation safe and easy. Wooden sash should fit the frame loosely and be made weather tight by the use of metal weather strips, otherwise sticking occurs during damp weather, and rattling at other times.

Is It Money Well Spent?

We frequently find a house with an extensive open porch, the cost of which would provide kitchen utilities such as a sink, water faucet, utensil rack, storage cabinet, and cupboards. Without modern equipment how much time can the housewife spend on such a structure when windy days, cold weather, and household duties have taken their toll of time? The modern tendency is away from open porches; they do not repay in appearance and utility their cost in hazard, construction, and upkeep. The sun parlor, the screened stoop, and the storm entry are serviceable the year around and offer protection against wind and water driving under doors of living room and kitchen.

Owing to the excellent insulation against heat transfer it offers, wood is a favorite building material even where other materials are readily obtained. Solid masonry walls are likely to conduct both heat and moisture to an extent exceeding that of a single board wall. With the depletion of our forests and the increasing prices of lumber there is more attention being paid to methods of insulation through the use of low priced composition material made of wood or sugar cane fiber. The secret of a dry wall inside is adequate ventilation and reasonable insulation, and either will fail without the other. One product of natural gas combustion is water vapor, and unless

the building is carefully ventilated, the windows double glazed, gas stoves provided with flues, and the walls insulated with wood or fiber board, there is certain to be condensation of moisture on surfaces in the room. The insulating effect of masonry is increased by incorporating within the wall numerous air cells, and the effect of these cells is greatest if the air within them does not circulate appreciably. One method of insulation often used is that of furring the interior of the wall and nailing the insulation to this furring, which in turn is painted or plastered. The only justification there is for brick veneer construction is that of insulation; the fire hazard is probably equal to that of frame, and the stability of the brick covering depends on the woodwork behind it; while the furred wall is virtually fire resistant.

An Oklahoma Cottage

The beauty of a farm house primarily depends upon three factors. The first is proportion, the second color, and the third setting. If an ornament is applied as an ornament it is in good taste, but where we fake a structural detail for the sake of accent or ornament it is decidedly bad taste; and not in keeping with the sincerity consistent with home design. Beside these windows are a pair of shutters which do not close nor would they cover the windows if closed. Lattice is better because frankly an ornament applied as such.

HINTS ON HEATING AND VENTILATION

We ought to note the inadequacy of window ventilation during the winter; the rate of air movement during a wind is high, and the direction of air currents through the building may vary considerably in direction as well as amount. In the past our stables were quite adequately ventilated through cracks and the livestock well toughened against unfavorable drafts; frozen combs and decreased milk production were taken as a matter of course, and pneumonia was part of the cost of raising pigs. Children went to school feeling languid, their faces pale, with dark circles under the eye; and the better the house they lived in, the worse thy felt. Stables and houses ought to utilize the controlled draft ventilation now so well worked out. Swing dampers are closed by air back-drafting through the ventilator flues during windy weather. Air leakage will pretty thoroughly ventilate a poorly constructed building, but it will not serve the purpose in first class modern construction utilizing steel windows, plastered masonry walls and concrete floors.

Steam, hot water, and electricity are now being employed for heating greenhousess, dairy and brooders; for residence heating warm air is, and will probably continue as the predominating type. Warm air heating systems respond quickly to firing, are easy to control, and low in first cost. They do not place objectionable hardware in the rooms, nor create unpleasant noises. If improperly installed they leak gas and fail to heat certain rooms at times. It is a common practice to place warm air registers in each room but depend on one large register in the hall or living room to return the needed cold air to the furnace; this is all right if we leave all doors open between rooms and wind does not blow, but if we close off one or more rooms, there will be difficulty heating because no avenue exists for the return of cool air to the furnace; no more warm air enters a room than sufficient to replace the cool air which escapes through ventilators or cold air registers. If the wind blows the warm air drifts through the lee pipes and leaves the windward rooms cold unless warm air is drawn to them by drawing cold air from their floors to the furnace. The necessity of keeping a balance between warm and cold air in each room necessitates the placing of two registers in each room, one for warm air, the other for the return of cooled air from this place to the furnace. Air from the bathroom should not be returned to the furnace, but be drawn off through a ventilator in the ceiling. Automatic draft control of the furnace dampers, with dampers in the warm air pipes, assists in controlling the distribution of warm air. It was formerly thought that one or two wrappings of asbestos paper increased the efficiency of the piping, but unless cellular wrapping is used the heat loss through the pipes is less if left bare. Long runs of pipe practically horizontal should be avoided; build the basement deep enough so that all pipes can have a decided pitch upward. No basement ceiling should be less than eight feet from the floor, and the usual damp, low, untidy basement is to be guarded against. Use tile underdrainage to assure dry floors and whitewash to insure good light distribution. Do not have wooden floor joists exposed over the furnace, but protect them with metal lath and cement plaster. All chimneys must rest on earth and not be carried by corbels or beams.